

GUJARAT TECHNOLOGICAL UNIVERSITY**M. E. - SEMESTER – I • EXAMINATION – WINTER 2012****Subject code: 714001N****Date: 08-01-2013****Subject Name: The Physics of Rubber Elasticity****Time: 02.30 pm – 05.00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

Q.1 (a) Explain about the Kinetic theory of elasticity. **(07)**

(b) Discuss in detail about The glass-rubber transition phase. **(07)**

Q.2 (a) Describe about the Thermal effects of extension. **(07)**

(b) Establish the stress-temperature relations for understanding the internal energy & entropy changes on deformation. **(07)**

OR

(b) Write about the Chemical constitution of rubbers. **(07)**

Q.3 (a) Determine the number of links and the length of the link for equivalent random chain. **(08)**

(b) List the significant properties of Gaussian network related to junction points. **(06)**

OR

Q.3 (a) Write in detail about the elastic properties of a swollen rubber. **(07)**

(b) Discuss the statistical properties of randomly jointed chain. **(07)**

Q.4 List the different types of Strain. Establish and explain the Particular Stress-Strain relations. **(14)**

OR

Q.4 (a) Explain about the direct method developed by Flory & co-workers for the estimation of the degree of cross linking. **(05)**

(b) Derive the equation for Calculation of entropy of deformation & work of deformation for a molecular chain. **(09)**

Q.5 Discuss in detail about the Statistical treatment of swelling. **(14)**

OR

Q.5 Establish the relation between swelling & modulus and explain in detail. **(14)**
